NumPy

In Python.

AGENDA

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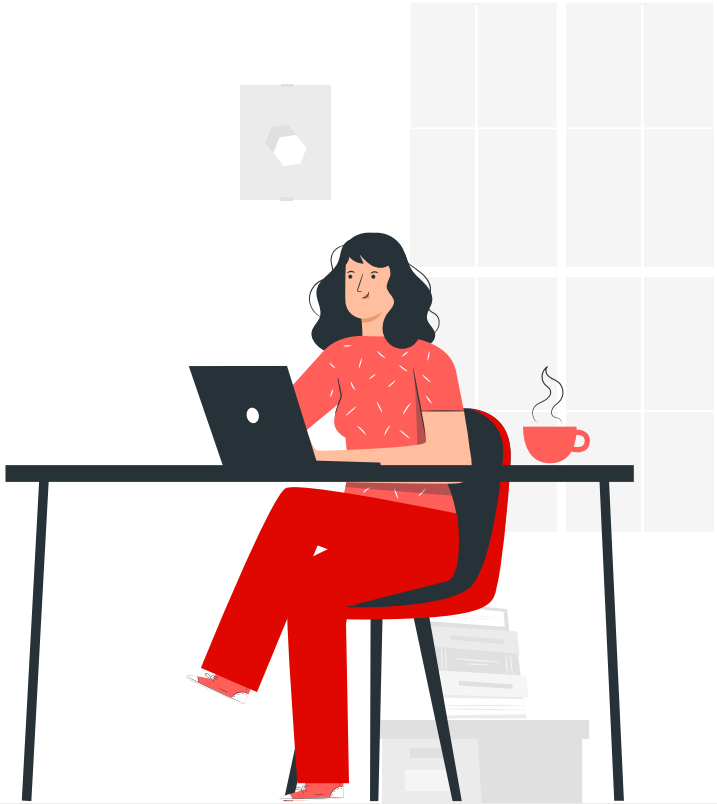
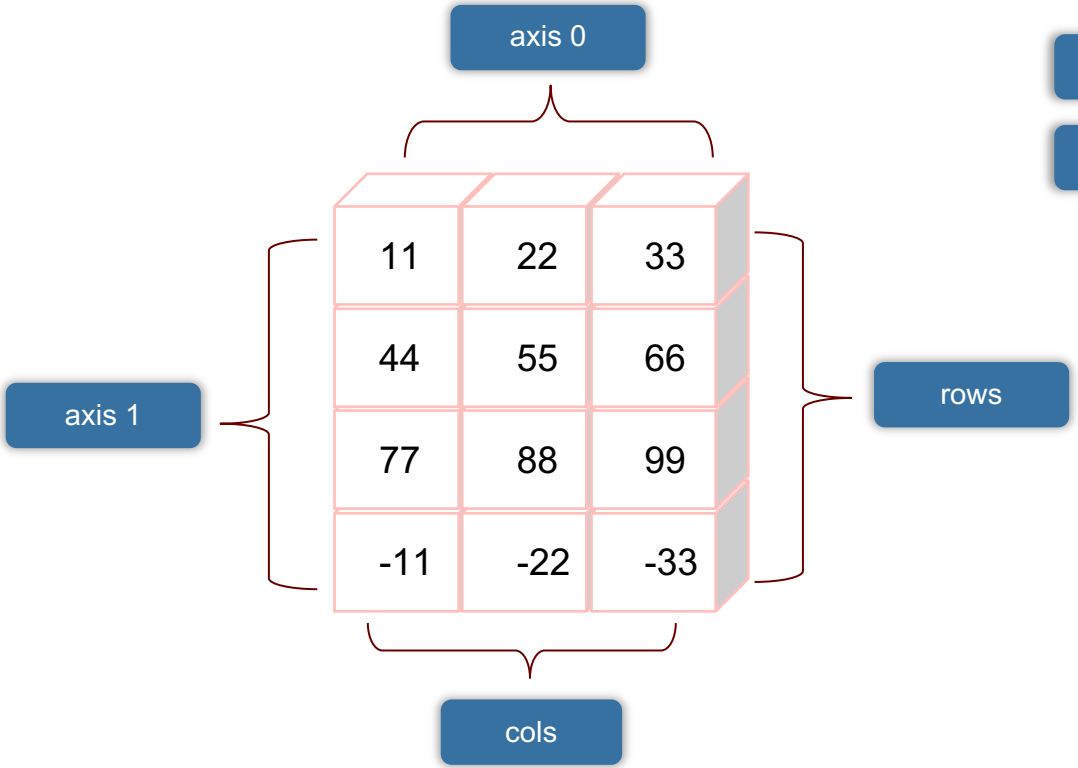


NumPy Operations

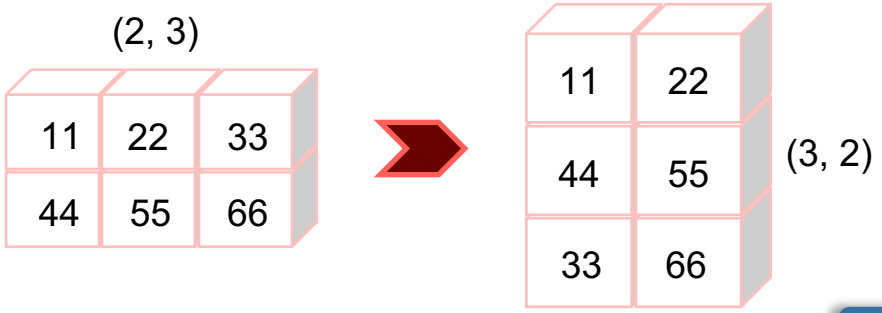
Rows, Columns, Axis, Reshape,

UNDERSTANDING ROWS & COLUMNS

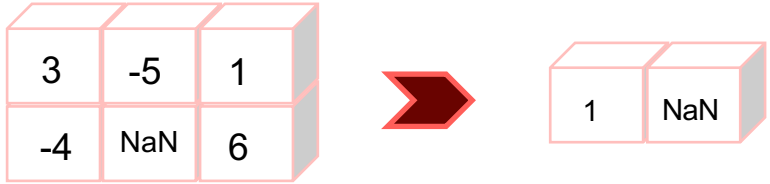


UNDERSTANDING Reshape & Slicing

Reshape : Gives a new shape to an array without changing its data.



Slicing : Extracting Elements from Array using indexing



Introduction

What is NumPy Array, Uses ?
What are Dimensions?

What is NumPy Array ?

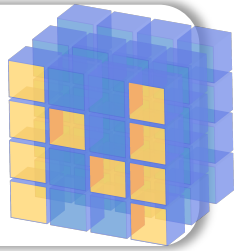
NumPy stands for **Numerical Python** and is the core library for numeric and Scientific computing.

It provides a high - performance multidimensional array object, and tools for working with these arrays.

Installation & Import

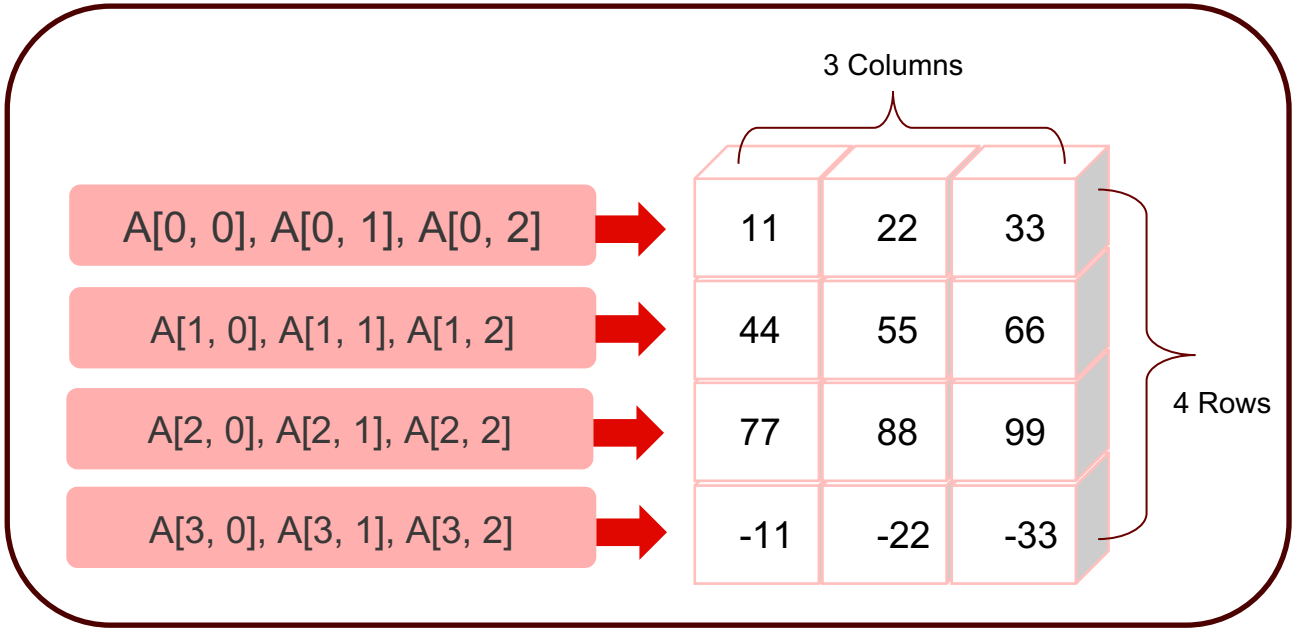
```
>>> pip install numpy

In [1] : import numpy as np
```



What are Dimensions ?

Let if A is a Matrix given below then to find the respective index values of A we can write it as:



NumPy vs List ?

Why should I use NumPy Array when I have List ? .

	Mutability	Homogeneity	Accessibility	Speed	Memory	Convenient
List	✓	✗	Integer Type	Less comparative to Np Array	Occupies more comparative to Np Array	Python Built-In Data Structure
NumPy Array	✓	✓	Integer Type	High Speed	Less Memory	High Performance Array and Mathematical Calculation

Phase – 1

Creating Array, Initial Placeholders,
Inspecting Array, Array Mathematics

Creating Array

We can define a numpy array in a list by inscribing it in the parenthesis of **np.array**

1 – D Array

```
1  arr = np.array([1, 2, 3])
2  arr
```

```
Out[2]: array([1, 2, 3])
```

2 – D Array

```
1  arr = np.array([[0, 1],[2, 3], [4,5]])
2  arr
```

```
Out[3]: array([[0, 1],
               [2, 3],
               [4, 5]])
```

Initial Placeholders

Operations	Descriptions
np.zeros([3,4])	Create an array of Zeros
np.ones([2, 3, 4], dtype = np.int16)	Create an array of Ones
np.arange(10, 25, 5)	Create an array of evenly spaced values (step values)
np.linspace(0, 2, 9)	Create an array of evenly spaced values (number of samples)
np.full([2, 2], 7)	Create a Constant Array
np.eye(2)	Create a Identity Matrix
np.random.random([2, 2])	Create an array with random values
np.empty([3, 2])	Create an empty array

Inspecting your Array

Operations	Descriptions
shape	Array Dimensions
len(arr)	Length of array
ndim	Number of array dimensions
ndmin	Define the number of Array Dimensions
size	Number of array elements
dtype	Data type array elements
dtype.name	Name of data type
astype	Convert an array to a different type
Itemsize	Define the size of each element in array

Array Mathematics

Operations	Descriptions
add	Addition of Arrays
subtract	Subtraction of Arrays
multiply	Multiply of Arrays
divide	Divide of Arrays
exp	Exponentiation
sqrt	Square Root
sin	sines of the array elements
cos	cosines of the array elements
log	log of the array elements
dot	Dot product of array

Phase – 2

Comparison, Aggregate Functions,
Copying Arrays, Sorting Arrays

Comparison

Operations	Descriptions
a == b	Element – wise Comparison
a < 2	Element – wise Comaprison
np.array_equal(a, b)	Array – wise comparison

Aggregate Functions

Operations	Descriptions
a.sum()	Array- wise sum
a.min()	Array wise minimum value
b.max(axis = 0)	Maximum value of an array row
b.cumsum(axis = 1)	Cumulative sum of the elements
b.median()	Median of the array b
a.mean()	Mean of the array a
a.corrcoef()	Correlation coefficient
np.std(b)	Standard Deviation

Copying Arrays & Sorting Arrays

Operations	Descriptions
a.view()	Create a view of the array with the same data
np.copy(a)	Create a copy of the array
a.copy()	Create a deep copy of the array

Operations	Descriptions
a.sort()	Sort an array
c.sort(axis = 0)	Sort the elements of an array's axis
a.copy()	Create a deep copy of the array

Phase – 3

Array Manipulation, I/O with NumPy Arrays.

Array Manipulation

Operations	Descriptions
np.transpose(b) / b.T	Permute Array Dimensions
b.ravel() , b.reshape(-1)	Flatten the Array
b.resize()	Return a new array with given size
np.append(arr, new_element)	Append items to the array
np.insert(arr, 1, 5)	Insert Items in an Array
np.delete(arr, [1])	Delete items from the array
np.concatenate((a,b))	Concatenate Arrays
np.vstack((a,b))	Stack Arrays vertically (row – wise)
np.hstack((a,b))	Stack Arrays horizontally (column – wise)
Np.split()	Split array into multiple sub-arrays of equal size.

Array Manipulation

Operations	Descriptions
np.hsplit (arr, 3)	Split the array horizontally at the 3rd index
np.vsplit (c, 2)	Split the array vertically at the 2nd index
np.iinfo	Define Integer Information and their Limits
np.finfo	Define Float Information and their Limits
np.nditer	Multidimensional iterator to iterate over array.
np.reshape	Gives a new shape to an array without changing its data.
np.flatten	Return a copy of array collapsed into one dimension.
np.array_split()	Split an array into multiple sub-arrays.

THANKS

Do you have any questions?
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